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Benthic foraminiferal stable isotope record of organic carbon fluxes during deposition of Mediterranean sapropel S1

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We integrated Late Glacial to Holocene stable isotope records for different epi- and endobenthic foraminifera from the Mediterranean Sea in order to document the sequence of environmental changes across formation of the most recent sapropel S1. The stable carbon isotope record of epibenthic taxa corroborates results from model experiments indicating a Late Glacial onset of deep-water stagnation with short-term reventilation events during cold intervals of the Heinrich event 1, the Younger Dryas, and the 8.2 event. The stable carbon isotope difference between epi- and shallow endobenthic foraminifera exhibits marked temporal fluctuations linked to microhabitat shifts and changes in organic matter fluxes. We generated a transfer function for organic carbon fluxes based on a correlation between the stable carbon isotope signature of modern benthic foraminifera and observed organic carbon flux rates from different Mediterranean basins. Application of this transfer function to the down-core data reveals generally elevated organic matter fluxes during the Last Glacial Maximum and the Younger Dryas, while values drop significantly during the Bølling-Allerød interstadial and with onset of the Holocene. Our results support a scenario where average organic matter fluxes in the eastern Mediterranean Sea were not significantly enhanced during formation of sapropel S1. Instead, our data corroborate earlier results from benthic foraminiferal faunal successions and model experiments suggesting that sufficient amounts of organic matter are buried under oligotrophic conditions in an intermittently hypoxic water column.